AVIATION

AUGUST 20, 1923 Issued Weekly PRICE 10 CENTS

Navy-Wright seaplane entered in Schneider Cup race which made 177.5 m.p.h. in recent trials

VOLUME XV

NUMBER 8

SPECIAL FEATURES

THE "TURKEY BUZZARD" GLIDER
FRENCH FUEL CONSUMPTION AIR RACES
FIGHTING BOLL WEEVIL WITH AIRPLANES
PRINCIPLES OF EFFICIENT AILERON DESIGN

THE GARDNER, MOFFAT CO., INC.
HIGHLAND, N. Y.
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AVIATION

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Vol XV August 20, 1923 No. 8

The Start of Night Flying

THIS month will probably mark the beginning of a new era in aviation. The night flying service of the Air Mail is scheduled to begin operations in the latter part of the month and the eyes of the entire aeronautical world are turning their attention on Omaha.

Since 1908, fifteen years ago, when the Wright brothers made their first public flights, there has been no event, in our opinion, that has marked such an advance in the practical application of the airplane to commercial purposes as the inauguration of the twenty-four-hour-a-day flying.

It is not too much to say that the United States Air Mail service is the only organization in the world that could undertake this experiment with good chances of success. Since the Air Mail Service was started by Otto Prager, then Second Assistant Postmaster General, its record has been a cause of continuous pride to this country. He looked at mail carrying by airplane from the Post Office viewpoint. He knew that to be worth while the Air Mail must achieve reliability and regularity. Blizzards in the winter, thunderstorms in the summer, fog, snow and wind have all been overcome by the dauntless pilots of the Air Mail, supported by an inspection and maintenance service which is probably the best in the world. Mr Prager will always receive the credit and honor due to pioneers in any hazardous enterprise.

Col. Paul Henderson has picked up the thread of advancement and through his farsighted enthusiasm has organized and developed the night flying idea into what will soon be a reality. Men of this mold are of the stuff that makes this country lead in so many fields of endeavor.

When night flying was first considered, it was not left to the good luck of a pilot or to the reliability of an engine to make a test of the scheme. Instead, it was approached from an engineering angle. The route was surveyed by experts, suggestions were invited from the Air Mail pilots and others experienced in cross country flying, finally, the lighting specialists of the country were called on for their best equipment. Orders were placed with three manufacturers for nine airplanes specially designed for this work, and the designers of these ships were not hampered by petty restrictions. They were told what the Air Mail Service wanted the airplanes to do and were left to work out the problems for themselves.

So when night flying is begun, it will be as successful as human ingenuity can make it at the present time, for it was thoroughly planned in advance, which reduces the fortuitous elements to a minimum. There are bound to be the difficulties that are always encountered in any new enterprise. Possibly, these will be overemphasized by the daily press, but nothing should be allowed to weaken the spirits of the courageous Air Mail people. Congress, too, should uphold the hands of these men of vision and common sense whose endeavors will bring to the United States another achievement of world wide import.

Commercial Air Transport

THE high hopes for commercial air transport that were entertained for a year or so after the war have not materialized. For a while, there was hardly a month that did not bring the news of another enterprise for the development of some air transport service. The stock sellers seized on commercial aviation as a fertile field, and it is sad to recall the losses sustained by credulous and uninformed investors.

The Aeromarine Airways has made a valiant effort to popularize the water airways, and Grover Loening's Newport enterprise was a creditable beginning. But outside of these two air lines little, except glowing newspaper publicity, has come from the promotion of air lines.

A subsidy, private or governmental, now appears to be necessary to do for commercial air transport what was done for the railroads in the pioneering days. Both of these forms of support are difficult to secure, and the outlook is frankly discouraging.

Some genius, like Farady in electricity, De Forest in radio, and Fulton in the steamboat, may perhaps come forth and make some startling discovery or improvement that will do for the airplane what these men did in their chosen lines. Until then, a hopeful spirit must be cherished by those in aviation, confidently looking to the future from the present enveloping pall of inactivity.

Fuel Consumption Races

AN innovation of far reaching consequences has been made in France with the organization of airplane races based on fuel consumption. As our readers may read in this issue, in one of these events, the Zenith Cup, such widely different ships as a light plane and a multi-seater cabin plane were pitted against one another. In this, as in another race, open to light planes, fuel economy was the basic factor determining the placing of the contestants.

This innovation is warmly to be commended, for the cost of commercial aviation largely depends on the airplane's pay load and this again is governed to a very great extent by the fuel consumption of the engine. Inasmuch as for every pound of gasoline and oil saved, a pound of pay load can be carried, the importance of this question becomes apparent. It is hoped that contests embodying this feature may be organized at an early date in this country.

Fighting Boll Weevil by Means of Airplanes

Army Air Service and Department of Agriculture Cooperate In Aerial Extermination Campaign

That airplanes can be successfully employed to apply poison to plants infected by growth feeding insects at a great saving in time, labor and money, was the conclusion arrived at by officials of the U S Department of Agriculture as a result of tests conducted last summer at Tallulah, La., when airplanes were used for distributing poison over several cotton fields in that locality to check the ravages of the cotton boll weevil, and more especially the cotton leaf worm, the extermination of the latter having become urgent because it made inroads in southern cotton fields in such vast numbers and began to breed so rapidly that whole acres of cotton were practically kept from blooming

"Dusting Planes" Efficient and Economical

Not only was the airplane a more efficient means of scattering and applying the poison powder, but it was an economical factor as well, for it was found that only an average of about 2 lb of calcium of arsenate per acre was required with an airplane, whereas previous to its use an average of 5 lb per acre were required

When the devastation among cotton fields by the leaf worm reached alarming proportions, the Department of Agriculture decided that experiments should be made to exterminate this pest through the use of calcium arsenate and paris green scattered freely by hand over the plants during the night or early morning, when the dew on the leaves would cause the powder to stick to the leaf, and thus have some effect To cover any one cotton field entailed a great deal of labor, because the applications would have to be repeated from time to time

Airplane experiments were next considered, and through cooperation with the Army Air Service, two planes were rigged up to conduct experiments at Tallulah. It was soon found that one airplane could scatter in a few hours enough calcium arsenate to kill all of the cotton leaf worms on a field; furthermore, the destruction of these leaf worms was practically complete

The Bureau of Entomology, Department of Agriculture, recently submitted to the Army Air Service a comprehensive report covering these cotton dusting experiments by airplane, same being compiled by B R Coad, Entomologist of the U S Bureau of Entomology, E Johnson, Agricultural Engineer, U S. Bureau of Roads, and 1st Lieut G L McNeil of the Army Air Service Mr Coad, who had heretofore opposed the idea of dusting plants from airplanes upon a purely theoretical standpoint, states that he has seen enough to completely change his views on the subject, and is of the opinion that, with the further development of dust feeding equipment, dusting applications can be made for boll weevil control

The two airplanes sent from the Montgomery Air Intermediate Depot, Montgomery, Ala, to Tallulah, La, to make these tests were piloted by Lieuts G L McNeil, and Charles T Skow, A A S Lieutenant Skow was replaced shortly afterward by Lieut C L Simon In addition to the pilots, three enlisted men were detailed on this duty, and the experimental work was further assisted for a few days by the presence of a photographic airplane from the Montgomery Depot, piloted by Lieutenant Arnold

Distributing Poison Powder

One of the drawbacks in the cotton dusting experiments was the lack of an efficient container or hopper for discharging the poison from the airplane A hopper of galvanized iron was constructed and fitted inside of the observer's cockpit, which occupied practically one-half of the space, leaving barely room enough for the observer to stand and turn the feed crank The hopper was provided with a hinged lid for filling from the top and had a capacity of 12,500 cu. in. The first results with this hopper were not satisfactory, as the rush of air caused by the propeller had a tendency to draw back up into the outlet tube of the hopper which was fitted through the bottom of the fuselage, thus interfering with the proper delivery of the dust. Furthermore, the eddies of air created behind the tube tended to draw the dust upward around the fuselage instead of causing it to blow downward.

Another hopper of similar shape was constructed, intended to be entirely automatic in operation, except the opening and closing of the feeder valve, but like its predecessor, it was a crude affair and could stand considerable improvement. No further efforts were made, however, to perfect the mechanical delivery of the poison powder, and the work resolved itself into a study of whether or not cotton plants could be effectively poisoned in this manner.

At the outset two problems were paramount, first could the planes be operated over a cotton field in such manner that it would be thoroughly subjected to the clouds of dust, second, could the dust be scattered from the plane into the cotton plants and caused to adhere to them in a quantity sufficient to effect insect control? To settle these questions, operations on a more or less plantation basis were undertaken. Two farms, located from 1½ to 5 miles from Tallulah, were selected for the study. A landing field was located near the center of what is called the Shirley Plantation. Both of these farms were heavily infested with cotton leaf worms during the first generation, and a very large number of these pupated successfully in the field which had been practically stripped of foliage by that generation. These pupa matured and the eggs laid by the adults started hatching about Aug. 20. The number of adults became so exceedingly great that the infestation of worms which developed proved to be one of the heaviest ever noted by the writers. Practically all of the plants were absolutely covered with eggs, and as these hatched some fields were found to have apparently an average of about fifty worms to the plant at the very outset.

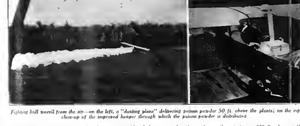
Experiences in Operation

The first studies conducted were for the purpose of noting the behavior of the dust in the air. In ordinary methods of poisoning, successful dusting can be done only when the air is calm and its success is greatly enhanced by the presence of moisture on cotton leaves. For these reasons, ordinary cotton dusting has become almost entirely a nocturnal affair, starting usually from 6 to 8 o'clock in the evening and continuing in the morning until the dew dried from the leaves and the breeze sprung up, which was usually sometime between 6 and 8 o'clock in the morning.

The first cotton dusting flights furnished an absolute surprise for all concerned. It was found that when the calcium arsenate was dropped from the plane it was immediately broken up into a circular cloud which was quickly blown down among the plants. This was obviously due to the tremendous air blast created by the slipstream of the propeller. This blast was so terrific that the powder encountering it became entirely subjected to its force, and the effect of ordinary air conditions was very largely overcome. Throughout the experimental period, flights were made at varying elevations, ranging from 5 to 50 ft. above the cotton plants, and while it was sometimes possible to distribute the dust down among the plants from even as high as 50 ft. or more, it was almost always possible to secure a distribution from 25 ft. or lower, regardless of air conditions.

The planes were prepared in the late evening for operation without delay the next morning, then everyone was on the field and the motors were warmed before the first break of day. Just as soon as it was light enough to see to fly, the planes took off, giving a very weird effect in the ground haze. This haze was so heavy that vision did not extend far enough above the field to see them when they left the ground, they seemed to simply disappear in the fog. Thirty feet above the ground the pilots found that they were out of this fog and that they had perfectly good air and good vision for flying, but from the ground it was very difficult to see the planes operate

The planes then crossed back and forth over the cotton fields flying at about the same level as during the daytime earlier in the work, about 15 ft. altitude, and a most curious effect was noted. Instead of a white dust cloud being swept out behind the plane, almost none was visible, although the feeders were wide open and putting out the dust at the usual rate. Flying at this elevation, the planes were inside of the fog of ground haze and they seemed to churn out a channel just slightly larger than the propeller, and the dust delivered was entirely confined by the wall of the fog surrounding this channel and did not spread out at all, merely coming down in a strip which did not cover more than three rows of cotton.



Fighting boll weevil from the air—on the left, a "dusting plane" delivering poison powder 50 ft above the plants, on the right, close-up of the improved hopper through which the poison powder is distributed

Dusting Above the Fog

In the next flights, made just as soon as the hoppers could be reloaded, different tactics were tried This time the planes were operated a few feet above the top of the fog, and the behavior of the dust changed entirely It was blown downward until it encountered the fog, but instead of immediately penetrating through it, it spread out on top of the fog in a layer from 50 to 100 ft. wide It seemed to remain at this point without motion, and the observers standing around in the cotton field under this fog were puzzled to know what would become of the dust It could be observed on the fog for some moments and then it seemed gradually to disappear. About the same instant, however, everyone in the cotton field noted that the air was absolutely filled with fine, almost invisible particles of dust falling to the plants. Furthermore, after a couple of minutes the plants which had been perfectly green before presented the whitened appearance of a very heavy dusting It would seem useless to fly the plane within the ground haze, but when the dust is distributed on top of this fog it apparently is spread very thoroughly and settled on the plants in an effective manner More studies, however, must be conducted on this point before any definite conclusions can be reached regarding operating under these conditions.

Analyses disclosed the fact that an astonishing amount of poison adhered to the cotton plants over a very wide path under atmospheric conditions such as to make it absolutely impossible to use a ground dusting machine and successfully treat the plants. The exact cause of this adhesion can only be guessed at, but judging from observations which have been made on the efficiency of different types of ground machines, with varying velocities of air blast, it seems quite possible that this remarkable result is again due to the tremendous blast of the propeller. From studies made it was evident that calcium arsenate dust could be blown down from an airplane onto the cotton plants at almost any time of the day and made to adhere to the plants in sufficient quantity to apparently effect insect control

Time tests showed that it required 2 min 15 sec. to empty a hopper containing 120 lb. of calcium arsenate, during which time the plane was operating at an average speed of 84 m.p.h., covering 3.3 miles. The average width of the strip covered with powder on these tests was 150 ft, showing that only 2 lb of poison were utilized per acre, is in decided contrast to the ordinary performance of cotton dusting, when the amount of powder used per acre is from 5 to 6 lb

Experiments were also made in dusting cotton plants with paris green. This material, however, flowed so rapidly through the opening in the hopper that the plants received too heavy a dosage, and were in many cases completely burnt up as a result. After a number of experiments in mixing the paris green with other ingredients it was found that a most effective mixture was one part of paris green, one-half part of lime and five parts of white flour This combination proved to work quite satisfactorily in the plane, and spread through the cotton and adhered to the plants very nicely As far as worm control is concerned, the effect of the paris green was much more pronounced than any other chemical utilized, since paris green is much more toxic to these larvae than other arsenicals. In every instance practically complete control was secured immediately after such applications, and it was thus shown that the instances of partial control with either calcium arsenate or lead arsenate were due to the lower toxicity of these materials rather than to faulty distribution.

Experiments Highly Promising

The only observation made on the effect of these poisons on the boll weevil was a rather casual one, but significant in a way Neither of the two farms had been poisoned during the season, and weevils were exceedingly abundant on both In fact, for a period of fully two weeks or more before the first airplane poisoning was done the weevils had so thoroughly infested both plantations that not a cotton bloom was visible This condition persisted throughout the beginning of the experiments, but by the time nearly all the fields on the two properties had received one or two applications of calcium arsenate for weevil control it was suddenly noted that cotton squares not infested with boll weevils were becoming fairly common, and by the end of the experimental period both plantations were blooming rather freely wherever the poisoning had been applied Of course, this cannot be positively accredited entirely to the dusting, since it quite frequently

happens that when the weevils have very heavily infested a field for a few weeks they leave it in search of new food and give it a period of rest during which a few blooms may struggle through to opening, but certainly considerable weevil control had been secured, since the blooming of these properties was much more pronounced than on other adjoining fields where no applications had been made. Furthermore, this late blooming did not develop on the few fields which had never developed sufficient worm infestation to require poisoning.

In conclusion, the report states that the studies made suggested many possibilities for future consideration. These studies were of a purely preliminary nature, but they did show quite definitely that the dust poisons could be effectively distributed over the cotton plants as far as worm control is concerned. Whether or not this distribution was sufficiently thorough to effect boll weevil control is another problem which must still be determined, since it requires much more thorough treatment to control the weevil than the worm. The results secured, however, justify rather optimistic views regarding the possibility of developing this method to the point where it can be successfully used against the weevil, especially since every step of the work conducted was in its most rudimentary and crude stage, and a great improvement in efficiency can be made in many ways.

Whether or not it will ever prove practicable to undertake commercial treatment of cotton fields for boll weevil control with the airplane is a question which has not yet been settled, but the results secured certainly warrant further consideration. Financially speaking, the use of the airplane does not seem to be out of the question. In fact, there is considerable possibility of pronounced economy as compared with ground machines. Furthermore, it has the advantage of centralizing the control of the operation and placing the whole thing on a more skilled basis which would undoubtedly greatly tend to increase the quality of the results attained. On the other hand, no farmer can afford to buy a single plane and figure on dusting his cotton, since it is absolutely not safe to place all of the eggs in one basket in this manner. Motors will go wrong and cotton poisoning is an operation which cannot be delayed when needed. On this basis the operation could be only considered as a community affair or for planters whose acreage would be large enough to justify purchasing more than one plane. In reality, to organize in safety, one plane should be provided in reserve for every one or two which are kept in flight. All of these are questions which can be worked out only by time and trial, but many districts in the south have now reached the point in public sentiment where the desirability of community weevil control can be seen, and it is only by some such methods as the use of the airplane that such community poisoning can be even considered in the near future.

Further experiments are being conducted this summer in Louisiana, using DH4B airplanes instead of the JN's. It is expected that better results will be obtained, since efforts are being made at the present time to provide a more suitable and efficient type of apparatus for distributing the poison powder.

The N.A.C.A. Kymograph

A highly ingenious instrument which the National Advisory Committee for Aeronautics uses in some of its aerodynamic investigations is the "kymograph", which has more than once been mentioned in these columns. A description of this instrument together with its method of operation was for the first time made public by Dr Joseph S. Ames, chairman of the N.A.C.A. executive committee, in the course of the Wilbur Wright Lecture which he gave on May 31, 1923, in London, England.

This instrument, which is illustrated herewith in a diagrammatic sketch, consists of a streamlined body, shaped like a bomb, from the front end of which projects a N.P.L. pitot tube, and which has a tail appendage to render the whole directionally stable. There is a transverse shaft through the center of mass, to the two ends of which are attached suspension wires leading to winches in the cockpit of the airplane, so that when the latter is in flight the kymograph may be lowered to a distance of 25 ft. so as to be in undisturbed air.

In the upper forward surface of the "bomb" there is an opening closed with a cylindrical lens, outside of which is a small vertical mirror, so that the rays of light from the sun may be reflected through the lens and then through two crossed slits on to a photographic film. The pitot tube is connected to a capsule manometer, whose motions are recorded on the same film. This is wound on a drum, inside of which is a constant speed electric motor driven by a current led in through the suspension wires of the instrument.

When the airplane is flown in a direction away from the sun, the kymograph takes a position along the direction of the

N.A.C.A. trailing Kymograph air speed meter

relative wind, and a continuous record will be made of the angular position of the sun with reference to this direction. An observer on the ground observes simultaneously the altitude of the sun, and so one obtains a record of the angle between the flight path with reference to the air and a horizontal line. The air-speed is measured at the same time as is also the angle of attack of the airplane itself. Therefore, if gliding flights are taken, values of the ratio of lift to drag may be measured at various angles of attack at known airspeeds. This method is obviously independent of vertical air currents.

French Aeronautical Notes

The French aircraft industry can manufacture in time of peace 6,000 planes per year, of these, last year 380 were manufactured for commercial use and 200 were exported. This number can be about doubled in time of war.

By October, 1922, 383 commercial airplanes had been registered in France as owned by companies or individuals. The relative growth in military and commercial aviation finds an interesting illustration in the percentages of these two types shown at the exhibitions since 1919. In that year military planes composed 25 per cent of the exhibit and commercial planes 12 per cent, in 1921 the ratio was 35 per cent and 19 per cent, respectively, in 1923 the military made up 43 per cent and the commercial 13.4 per cent.

The "Société de Propagande Aéronautique" propose to make a propaganda for the use of the airplane in France, and later in other parts of Europe. Their purpose is to familiarize the public with the airplane as an object of every day life which is to be used as are other means of transportation, to show that it is not more dangerous, and is a comfortable and convenient means of travel and thus to encourage the sale of planes and improve commercial connections.

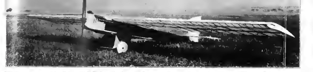
The position held by France in developing the science of aviation, particularly in the field of commercial flying, is being aided and sustained by the great number of prizes offered for 1923 on the part of government, cities, clubs, and private concerns, Vice Consul T. B. Dawson, Paris, reports to the Department of Commerce. The money prizes alone from all sources to date total 4,262,000 francs. The prizes offered are for all types of aircraft and aero engines.

The French civil aviation budget for the year 1923 is F 138,443,350. Of this sum F 41,422,000 is set aside for subsidizing approved commercial air services, F 3,000,000 for aviation companies operating refresher courses for reserve pilots, F 1,000,000 for propaganda, F 922,000 for premiums to tourist airplanes, and F 173,000 for subsidies to technical schools of aeronautics.

"Grand Prix de la Moto-Aviette" Reviewed

French Light Plane Race, Won by Farman, Showed Surprising Progress in Low Powered Flight

Interesting details are now on hand regarding the French light plane race known as the "Grand Prix de la Moto-Aviette" which the Paris daily paper *Petit Parisien* endowed with 100,000 francs of cash prizes. Held July 15 at Buc airdrome, near Paris, the race was won by a Farman light plane piloted by Lucien Coupet, who covered a total distance of 310 km. in 4 hr 37 min. 19 sec. The race was run in a succession of rain storms and fog that taxed the airworthiness of the little ship and the ability of the pilots to the utmost, and explains partly the fact that no contestant outside of the Farman finished the race. Three contestants were eliminated by short



The youngest son of the Farman "Goliath"—the Farman light plane (15 hp Salmson engine) on which Lucien Coupet won the "Grand Prix de la Moto-Aviette" on July 15

circuited spark plugs, due to the drenching rain, while two abandoned on account of valve trouble, and one ran out of fuel.

The race was open to airplanes having a total weight of 250 kg in the case of single seaters, and 320 kg in the case of two seaters, the weight limits including in each case a maximum allowance of 20 kg for fuel and oil. With this fuel allowance the contestants must cover a 10 kilometer course the greatest number of times, a minimum of thirty laps being required for qualification. First place was to be awarded the contestant having covered the greatest number of laps in excess of thirty. Prior to the race a climbing test of 500 meters in 30 min was required of the contestants.

The "Grand Prix" received nineteen entries, as follows: Four machines entered by H. & M. Farman, three by Dewoitine and one each by Bréguet, Desgrandchamps, Marais, Rossier & Vaillant, Hanriot, Dits-Moineau, Peyret, Carmier ("Simplex"), Collet, Lachassagne, Fornier & Vaillant, and Bonhards. Although only seven of these entries (three Farman, three Dewoitine and the Bréguet) actually competed in the race, most of the others not being ready in time or failing to pass the preliminary trials, the technical details of all entries are of great interest as they represent new constructions. Furthermore, if we except the products of a few well known aircraft constructors, most of the ships entered were built by private experimenters who had no or little previous aircraft building experience. Hence their labors are interesting to review, for they often introduce new ideas.

The Farman Entries

The four Farman planes, three of which started and one of which won the race, were all identical in type and measurements. They are cantilever monoplanes of 15 sq m wing area, 10 m span, 5.66 m. overall length and 2.28 m. height. The winning ship was fitted with a three cylinder radial, air-cooled Salmson engine of 70 mm. bore and 86 mm. stroke, which develops 12 hp. at 1800 r.p.m. (normal horsepower) and 16 hp at 2400 r.p.m. The propeller is direct driven. The engine is fitted with a decompression device which permits the propeller to turn practically free, as a fan. This little power plant was designed and built in two months. Fitted with the Salmson, the Farman light plane weighs empty 105 kg. and loaded for the race approximately 195 kg. Two other Farmans were equipped with a four cylinder vertical Sergant 10 hp. engine, which is remarkable for the small bore of its cylinders, its high rotational speed, and a reduction gear. The bore is only 56 mm, and the stroke 80 mm, and the normal engine speed 3200 r.p.m. The propeller is naturally geared down to a much lower speed. A noteworthy feature of this engine is that the cooling fins are not grooved horizontally, as is usual, but vertically, there being an air scoop which directs the flow of air along the cylinder walls. Overhead valves are used. Fitted with the Sergant engine, which weighs complete 47 kg, the Farman light plane has a weight empty of 115 kg, or 10 kg more than the Salmson powered ship. The fourth Farman was to be fitted with a Violet-Sicam engine, of which no particulars are available, but this ship did not start.

Constructionally the Farman light plane bears, as may be seen from the accompanying illustration, unmistakable signs of family resemblance with all Farman products. The wings are wire braced wooden structure covered with fabric, and the fuselage is of the four longeron type, with veneer panel planking and no wire bracing. There is no vertical fin, and the ailerons are of very large size, to give ample control. The landing gear struts are of three ply wood. The machine is a development of the Farman "Moustique" glider on which Bossoutrot last spring made a 4 hr gliding flight.

The Dewoitine Entries

The three Dewoitine planes are also identical in construction, but each is fitted with a different engine—Clerget, Salmson and Vaslin. The total weight varies very little with the different power plants, being between 244 and 248 kg. This ship is of the same type as the one which Georges Barbot demonstrated in this country. It is a cantilever monoplane of 15 sq m wing area, 12.60 m span, 5.60 m overall length and 2.10 m height. The area of the elevator is 2.20 sq m, and the rudder area 0.48 sq m. The wings are wire braced and fabric covered wooden structures, and the fuselage consists of four longerons braced with veneer planking. Unlike the Farman, which has wings of rectangular plan form, the Dewoitine has wings of trapezoidal shape, which taper both in

chord and thickness toward the tips. No horizontal stabilizer is fitted.

The Clerget engine fitted to one of these ships differs in several particulars from the power plant used in the English Channel crossing, which Barbot also used in this country. The new engine has a bore of 85 mm., a stroke of 120 mm and develops a maximum of 15 hp at 1600 r.p.m., although its normal rating is 1400 r.p.m., giving about 12 hp Roller bearings have been substituted for the ball bearings originally used, and a pressure lubrication system, with no oil pump, installed The intake manifold leads through the lower part of the crankcase, which acts as an oil sump, so that the fuel is heated before admission

The Salmson engine used on one of the Dewoitines is the same as that fitted to the Farman The Vaslin engine, with which the third Dewoitine ship was equipped, is a four-cylinder horizontal opposed type, cooled by air, which develops 12 hp at 1400 r.p.m. and weighs complete 41.5 kg The bore is 64 mm and the stroke 85 mm The valves are operated by pushrods, and lubrication is of the centrifugal type Steel cylinders and cast iron cylinder heads are used

The average distribution of weights in the Dewoitine light planes is as follows glider, 110 kg, engine, propeller and tanks, 40 kg fuel and oil for 5 hr, 20 kg, pilot and accessories, 80 kg, total 250 kg The maximum speed of the ship is 90 100 km/hr and the landing speed 30 km/hr

The Breguet Entry

The Breguet entry known as the "Colibri", is a four-strut-braced monoplane having wooden wings of trapezoidal form, and metal fuselage and tail frames This ship was to have been fitted with a small Renault engine, but in the race a 16 hp Sergant engine was used instead The "Colibri" has a wing area of 15 sq m, a span of 10.40 m, an overall length of 6.10 m and weighs loaded 188 kg. It was one of the lightest planes entered in the race

The Desgrandschamps is a cantilever monoplane equipped with a 10 hp A B C, and is notable for its unusually thick wing, which encloses the pilot's cockpit, and for the lack of a fuselage Two tail booms carry the empennage which consists of a double rudder and a raised elevator The span is 7.70 m, the overall length 5.20 m, the wing area 13 sq m and the gross weight 250 kg As the power plant of this ship was not of French manufacture, and the constructor lacked time to substitute a French engine, it did not participate in the race The ship is also entered in the Vauville glider and light plane meet

The Marais light plane is also a cantilever monoplane and has the following characteristics span 9.80 m, overall length 4.75 m, wing area 13.5 sq m, weight loaded 250 kg Lack of a suitable French engine has prevented this ship from taking part in the race, as the trial flights were made with a 10 hp Anzani engine, which is of Italian make

The Rossier-Vaillant is a monoplane with externally braced wings of 10 m span, 5 m. overall length, 10 sq m wing area, and 80 kg weight empty A 10 hp Anzani engine used on the trial flights, and a French engine was to be substituted, but this was not available in time The same reason prevented the Fornier-Vaillant light plane from taking part in the race This ship measures 7 m in span, 4 m in overall length and has 8 sq m wing area The weight empty is 80 kg

Hanriot Light Plane

The Hanriot light plane is a braced biplane with staggered wings, measuring 6 m in span, 5.60 m in overall length, and 2 m in height The wing area is 12 sq m., the weight empty 90 kg, and the weight loaded 180 kg The power plant is a 10 hp Gnôme-Rhône

The Dita Moineau is a tailless cantilever monoplane of 14 sq m wing area, 8.50 m span, 5.50 m overall length, 1.50 m height, and 155 kg weight empty The engine is a 15 hp Sergant The Carmier or "Simplex" is also a tailless monoplane, having two sets of ailerons for lateral and longitudinal control One set is adjustable for a given angle. Directional control is insured by means of a vertical fin and a rudder Span 9 m, overall length 3.60 m, wing area 20 sq m., weight loaded 250 kg Engine, 15 hp Sergant

The Lachassagne is a monoplane with variable camber wings and variable camber tail plane The wings are fixed under the fuselage and braced to the latter by means of four struts. The wing area is 8.30 sq m., span 9 m., overall length 4.70 m., height 1.45 m., weight loaded 225 kg The engine is an 18 hp Darracq This ship was not ready for the race due to lack of funds.

A Peyret Light Plane

The Peyret is an orthodox strut braced monoplane which is mainly interesting because of the use of ailerons running the full length of the wings, just as in the Peyret tandem glider, and which are used both for lateral and longitudinal control In the latter case the movement of the ailerons is combined with that of an elevator, but there is no fixed stabilizer The wings are built up of duralumin wing beams and three-ply ribs, the covering being of rubberized fabric The ribs are very light, weighing only 87 grams each and have withstood a load of 90 kg without failure The wing struts are streamlined duralumin tubes. The fuselage consists of four wooden longerons covered with veneer panels. The wing area is 15 sq m., the span 9.85 m., overall length 5.57 m., height 1.90 m., and the weight loaded 240 kg. Fitted with a 15 hp Sergant engine, the ship has a maximum speed of 90 km/hr and a minimum speed of 44 km/hr The ceiling is between 3500 and 4000 m

The Boishardy light plane, built by the Salmson firm to the designs of M Béchereau, the famous designer of the war time Spad pursuit planes, was barely completed in time for the race The ship is a strut braced monoplane of 14 sq m wing area 8 m span, 6.10 m overall length, 1.70 m height and 245 kg weight loaded Lack of a suitable propeller caused the withdrawal of this ship from the contest

No information is on hand regarding the Collet light plane

Regarding the elimination trials and the race the following data will be of interest The climbing trials of 500 m in 30 min were easily accomplished by the Farmans, the Dewoitines, and the Bréguet The Farmans climbed 550 m in from 7 to 7½ min., the Bréguet 880 m in 27 min while the pilots of the three Dewoitines made the following performances Barbot 650 m in 24 min. and 500 m. in 17 min., Finat 530 m. in 27 min., and Doret 600 m in 35 min and 500 m. in 26½ min

How the Race was Ran

As was said before, the race was run in atrocious weather, thunderstorms and squalls alternating with fog The first lap of 10 km was covered by all the seven contestants in the following times Doret (Dewoitine) 7 min. 45 sec., Thoret (Breguet) 7 min 52 sec., Barbot (Dewoitine) 7 min 56 sec., Bossoutrot (Farman) 8 min 4 sec., Finat (Dewoitine) 8 min 52 sec., Drouhin (Farman) 9 min. 9 sec., Coupet (Farman) 9 min. 46 sec It was at once apparent that the Dewoitines and the Bréguet were chiefly because of their fine lines much faster ships than the Farmans, the latter relying mainly on their light weight to win the race in case of bad wind conditions

However, on the second lap the Farman of Drouhin dropped out of the running, and on the third lap Bossoutrot followed him down. Thoret on the Bréguet did likewise in the fourth lap All three pilots had their spark plugs short circuited in a thunderstorm. The two Farmans nosed over on landing, but without much damage, the pilots being unhurt This left Coupet's Farman alone against the three Dewoitines, a heavy handicap, considering the higher speed of these ships Barbot attracted much attention by the splendid banked turns he made on his Clerget powered Dewoitine, making about 75 km/hr. Doret, also on a Dewoitine, flew very close to the ground at about the same speed, while Finat, on the third Dewoitine, and Coupet on the remaining Farman both flew fairly high, with easy turns, making not more than 60 km./hr

At the end of the tenth lap Doret and Barbot were leading with Coupet third and Finat fourth In the 13th lap Finat made a forced landing on account of valve trouble, and the same thing happened to Doret in the 19th lap But Barbot was still handsomely in the lead, for he covered the twenty laps in 2 hr 38 min 22 sec as against 3 hr. 6 min 31 sec for Coupet's Farman Barbot's victory seemed certain, when in the 28th lap he ran out of fuel and was forced to land. This left Coupet alone in the race which he duly finished, landing only after having covered a 31st lap, and covering the 30 km. in 4 hr 37 min. 19 sec., or at an average speed of 64.7 km/hr. Translated into English units, his total fuel consumption for the 192 miles distance was 26.8 lb of gasoline and 0.5 lb. of oil—approximately 45 miles to the gallon On landing 12 lb. of gasoline still remained in the tank.

Coupet thus won the 100,000 francs cash prize of the *Petit Parisien*, while Barbot was awarded the sum of 20,000 francs as a consolation prize.

While the atmospheric conditions had much to do with the dropping out of the contestants, much of the engine and propeller trouble experienced before and during the race was due to the short time available for tuning up the power plants. We have already mentioned that the winning engine was designed, built and tested in two months, but several other power plants were only mounted in the planes a few days before the race, which for some of them constituted the first flying trials. That under such circumstances engine failure must have played an important role in the history of the race is only natural

Nevertheless, such as it was, the race proved one thing, namely that light planes are by no means the dangerous playthings they are sometimes represented to be. That despite the great handicap of incompletely tuned up engines, they were capable of performing satisfactorily in a race held under gruelling weather conditions, vindicates the new school of thought devoted to economical flight The race did not produce the ideal tourist airplane as yet, but it points the road to the necessary improvements from which it will spring

France Holds Novel Fuel Consumption Race

Zenith Cup Won by Farman F90 Commercial Transport Airplane

The first annual contest for the Zenith Cup, a trophy offered by the French manufacturers of Zenith carburetor, to reward the best load carrying performance with the lowest fuel consumption, held July 21 and 22, last, was won by Lucien Bossoutrot on a Farman F90 cabin transport plane equipped with a 260 hp Salmson engine and Lamblin radiator. The same ship won last December the air transport competition for the Grand Prize of Paris.

The Zenith Cup race offered from the organizing viewpoint some unusual features of interest in that no limit was placed on the horsepower, gross weight, speed or wing area of the competing planes The rules merely provided that the contestants must not consume more than 275 kg. of fuel for covering the Paris-Lyons-Paris course, a distance of 770 km., that their average speed must not be less than 70 km./hr., and that the Paris-Lyons and Lyons-Paris legs of the race must be covered non-stop Consequently the rules enabled low powered light planes to compete with high powered commercial ships. Such a provision may seem odd at first sight, but in practice it worked out all right, for the fuel limitation handicapped high powered machines that might have won on the sole merit of high speed and useful load, while the length of the non-stop flights strongly handicapped the light planes which might otherwise be unduly favored on account of their low fuel-consumption. The race was run on two consecutive days, the first day from Paris to Lyons, and the second day return to Paris.

The following list shows the planes entered (The symbols PL and FL indicate pay load, including pilot, and fuel load, respectively.)

1 Potez type VIII sport biplane (80 hp Anzani) Pilot, Lafon PL—155 kg; FL—71.5 kg

2 Farman F90 5-seater cabin plane (260 hp Salmson) Pilot, Bossoutrot PL—500 kg, FL—190 kg

3 Peyret light plane (12-15 hp Sergant) Pilot, Maneyrol Did not start

4 Caudron C27 sport biplane (180 hp Hispano) Pilot, Bécheler PL—200 kg, FL—108.4 kg

5 Caudron C59 sport biplane (80 hp Le Rhône) Pilot, Vanlaere PL—215 kg, FL—97.8 kg

6 Dewoitine light plane (15 hp Vaslin) Pilot, Maurice Finat PL—90 kg, FL—29.2 kg

The Farman F90 5-passenger cabin ship (260 hp Salmson) which won the Zenith Cup race between Paris and Lyons, France, July 21-22

7 Spad S29 sport biplane (120 hp Le Rhône). Pilot Robert Bajac. Did not start.

8 Buscaylet-de Monge monoplane (twn 35 hp. Anzani). Pilot, Brosseaux. Did not start.

9 Potez type VIII sport biplane (80 hp. Anzani). Pilot, Jacques Rocques. PL—154 kg; FL—68.5 kg.

The start of the race took place in splendid weather at Orly airdrome, well known to American pilots who went overseas, which is situated South of Paris. The starts were given from 11:20 a. m. on, and each contestant was entitled to only one start—a provision made to approximate conditions prevailing in commercial operation Pilots Finat, Lafon, Rocques, Vanlaere and Bossoutrot took off in the order indicated, but Finat, on the little Dewoitine, had difficulties with a rebellious engine before he had gone beyond the airdrome, and so he returned and landed

The other four pilots had no trouble whatever, all landing without any incident at Bron airdrome, near Lyons, Bossoutrot on the Farman arriving first, followed by Bécheler Vanlaere and Rocques. The following day the return flight was likewise completed by all four pilots, who again finished in the order indicated for the first leg of the race Vanlaere, on the Caudron C59, however, had trouble with his fuel pump and had to land en route, which eliminated him from the placing

Following are some interesting technical data on the three machines placed

First—Bossoutrot on Farman F90 (260 hp Salmson, Lamblin radiator) Fuel consumption, 235.77 kg Pay load, 498.4 kg Fuel consumption per pay load, 475 grams/kg

Second—Rocques on Potez VIII (80 hp Anzani) Fuel consumption, 94.05 kg Pay load, 154 kg Fuel consumption per pay load, 616 grams/kg

Third—Bécheler on Caudron C59 (180 hp Hispano) Fuel consumption, 184.43 kg Pay load, 200 kg Fuel consumption per pay load, 922 grams/kg

Thus, closely following its victory in the "Grand Prix de la Moto-Aviette," the Farman-Salmson combination once again was victorious. Inasmuch as the Farman F90 also won first place in the air transport competition known as the "Grand Prix de Paris," held last December, this ship is now considered in France as the most practical and economical single-engined airplane for mail and passenger transport.

Bossoutrot, the winning pilot, received in addition to the Cup a cash prize of F 30,000, Rocques a cash prize of F. 5,000, and Bécheler a cash prize of F. 3,000 Other cash prizes, which were not awarded, will be used to increase next year's awards

Helicopter Calculations

Much serious thought and money is being spent these days on the helicopter or direct lift machine Sir Samuel Hoare, British air minister, stated recently in the House of Commons that to date the British government has spent £41,000 in the development of the helicopter produced by Louis Brennan, and that, in view of the stage at which the experiments had arrived it would be a pity to discontinue them The money spent on the Brennan helicopter is additional to the £50,000 prize which the British government offers for a helicopter competition to be held in the spring of 1924, and from which the Brennan machine is excluded

In France the government has also spent much money on various helicopters, chiefly on the Pescara and the Oehmichen-Peugeot, the latter of which it recently purchased after extensive trials Finally, in this country about $280,000 was spent by the Army Air Service in the development of the remarkable de Bothezat helicopter

In spite of the evident interest which attaches to this type of heavier-than air craft, simple formulas are not readily available for calculating the probable performance of a helicopter This is largely due to the fact that helicopters are still in the development stage, and calculations are necessarily empirical

M E Oehmichen, the inventor of the helicopter which bears his name, in a recent communication to *L'Aero-Sports* of Paris furnished some highly interesting particulars on the exact study of a helicopter To determine helicopter performance, he adopts the following formula, derived from the one proposed by Colonel Renard "For a given propeller the weight lifted per horsepower is inversely proportional to the square root of the load."

For instance, if a propeller lifts 100 kilograms with 10 hp., giving a "propeller loading" of 10 kilograms per horsepower, and it is desired to have this propeller lift 200 kilograms then the propeller loading P_1 will be governed by the following formula

$$P_1 = \frac{10}{\sqrt{2}} = 7.5 \text{ kg/hp}$$

from which the total horsepower required to lift 200 kilograms is expressed by the formula

$$HP = \frac{200}{7.5} = 28.4 \text{ hp}$$

For a load of 300 kilograms the formula will read

$$P_1 = \frac{10}{\sqrt{3}} = 5.75 \text{ kg/hp}$$

which gives a total horsepower required of 52.2 for a load of 300 kilograms.

On the other hand, if the load lifted with this same propeller is only 50 kilograms, the power loading equals $10 \times \sqrt{2} = 14.1$ kg/hp, and the horsepower required will be 3.5 hp

From these formulas M Oehmichen has compiled the following table, which he experimentally found to be accurate within 1 per cent

TABLE I

Total wt lifted kg	*Horsepower required*	*Power loading kg/hp*
50	3.5	14.1
100	10.0	10.0
200	28.4	7.5
300	52.2	5.75

For two geometrically similar propellers of different diameters, the load carried with the same power loading varies as the square of the propeller diameter For instance, if a propeller of 1 meter diameter lifts 2.5 kilograms with 0.1555 hp, or 16 kg/hp, then a geometrically similar propeller of 2 meters diameter will lift $2.5 \times 4 = 10$ kg with the same power loading of 16 kg/hp

On the basis of this formula the following table shows, for the same power loading, the total load carried with different propeller diameters

TABLE II

Propeller diameter m	*Power loading kg/hp*	*Total weight lifted kg*	*Horsepower required*
1	16	2.5	0.155
2	16	10.0	0.625
3	16	22.5	1.400
4	16	40.0	2.500
5	16	62.5	3.850

It follows from these calculations that it is advantageous to fit a helicopter with large propellers turning slowly, or to use the largest number of propellers that may be fitted to a machine, since this will also mean a relative light loading and therefore an advantageous loading for the propellers. It also follows, however, that the propeller diameter for helicopters has a practical maximum limit of 6 or 7 meters. It should be noted, however, that M. Oehmichen is of the opinion that in the future propellers of smaller diameter or heavier loading per horsepower will be possible without a corresponding loss in efficiency. Reference to Table II shows, that while a single propeller of 4 meters diameter lifts 40 kilograms with 2.5 hp, four propellers of 1 meter diameter only lift an aggregate weight of 8.2 kilograms, although the power expenditure in the latter case is 6.22 hp

Light Plane Flies High

A Farman light plane piloted by Lucien Coupet, the winner of the 100,080 francs prize offered by a Paris daily for a light plane race, on Aug. 5 rose to an altitude of 3100 meters in 1 hr 20 min The performance was officially supervised by the Aero Club of France

Principles of Efficient Aileron Design*

Fundamental Requirements for Effective Lateral Control

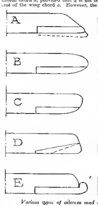
By W. S. DIEHL

Recent data have shown that certain forms or types of ailerons in extensive use, are in reality quite inefficient and entirely unsuited for the high speeds now realized.

The most important of the characteristics required of ailerons are (1) Effectiveness under all conditions of flight, (2) Small moments about the hinge, (3) High efficiency (small yawing moment opposing turn); (4) Simplicity in construction.

Chord, Span and Area

Tests conducted at the National Physical Laboratory (British A.C.A.R. & M. 550 and 615) show that the maximum rolling moment obtained is practically independent of the aileron chord d, provided that d is not less than about 15 per cent of the wing chord c. However, the greater the value of



A — Old type. Inefficient. Form shown with dotted lines is less efficient. Neither form is recommended

B — Elliptical tip. Efficient ailerons, recommended type. Very good for high speed designs.

C — Raked tip. Efficient ailerons, recommended type for general use

D — Raked tip — Skew ailerons Very Inefficient. Not to be used.

E — Raked tip with overhung aileron balance. Inefficient. Subject to very high local loading. Not to be used on high speed designs.

Various types of ailerons used on airplanes

d/c, the greater the moments about the hinge, the greater the yawing moments (opposing turn), and the less the rolling moments per unit aileron area. In general, the best results are obtained when d/c is between 0.20 and 0.30

The ratio of rolling moment to hinge moment, usually called aileron efficiency, is found to be a maximum when $L/b = 2/3$. For the best average results L/b should be greater than 0.35 and less than 0.70. Very long ailerons are liable to deflect and bind at the hinges.

For the average airplane the aileron area is about 11 per cent of the wing area This would correspond to an aileron with $d/c = 1/3$ and $L/b = 1/3$

These proportions were once in extensive use, although the present tendency is toward narrower ailerons.

Too much aileron area is used in many cases, particularly with the older designs in which d/c is large There is a well-defined lower limit to the amount of aileron area required for a given degree of lateral control, in this case, corresponding to $d/c = 0.20$ and $L/b = 0.50$

Plan Form

The plan form of the ailerons is partially fixed by the plan form of the wings. Tests have shown that the best results are obtained from a wing tip rounded elliptically or raked with the leading edge longer than the trailing edge. The wing tips should never be raked with the leading edge shorter than the trailing edge for several reasons, the most important of which is the extremely high loading which occurs on the extreme tip of this type of wing. With the ordinary construction this peak in loading comes on the aileron and increases the hinge moments while decreasing the aileron efficiency. Another reason for avoiding the wing tip raked so that the leading edge is shorter than the trailing edge, may be found in the behavior of the general pressure distribution on the wing tip It is well known that a slight washout in angle of attack toward the tip improves the performance of the wing by preventing the early breakdown in lift which first takes place on the tip, and thus equalizing the loading over the wing It may easily be seen that the old type of aileron shown as A in Fig 1, gives an increase in angle toward the tip and that the flow must be seriously disturbed

The best plan form for an aileron is not as yet definitely determined, although it is known that certain forms such as B and C give very good results. These forms are recommended for general use

The "skew" setting is objectionable when of the form shown in D The full effect of the angular movement is lost and the loading is objectionable. Difficulty is liable to be met with this form of aileron binding when the wing deflects. The hinges of all ailerons should be so arranged as to minimize the effect of any warp or twist in the wing.

General Conclusions

The following conclusions may be drawn from a study of the references given below

(1) The aileron chord should be about 25 per cent of the wing chord—never more than 33 per cent and never less than 20 per cent. It is recommended that 30 per cent be used as the upper limit

(2) The aileron span should be greater than 35 per cent of the semi-wing span With an aileron having $t/c = 0.25$, the span should be between 40 per cent and 50 per cent of the semi-wing span for normal control when the wing has an aspect ratio of 6

(3) In the general case the aileron area should vary from 6 per cent to 12 per cent of the wing area as the aileron chord varies from 20 per cent to 35 per cent of the wing chord.

(4) The plan form of the aileron should be such that there is in effect a washout of angle of attack toward the tip—such as that given on a normal aileron on an elliptically rounded wing tip

(5) The aileron should never extend beyond the mean tip of the wing.

(6) All types of skew settings are to be discouraged

(7) The aileron hinges should be designed to prevent binding if the wing deflects or twists.

(8) Ailerons on high speed airplanes should always be of

*Excerpts from N.A.C.A. Technical Note No. 144 Originally prepared as Technical Note No 240, Bureau of Aeronautics, Navy Department

the forms B or C, or some modification of these forms, and should be made very rigid to prevent vibration.

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The "Turkey Buzzard" Glider

The "Turkey Buzzard" was designed by D. T. Brown and Roy G. Miller, aeronautical engineers at the Naval Aircraft Factory in Philadelphia, as a glider or sailplane specially adapted to construction by amateurs. The design was entered in the glider design competition organized last spring by *Flight* of London and was awarded first prize.

The structure follows conventional practice insofar as possible. The number of metal fittings has been kept to the minimum and the use of complicated parts has been avoided.

Wing Construction

The wing is a semi-internally braced monoplane of 32 ft span. The middle portion is parallel in plan and profile for a length of 12 ft. The Göttingen No. 426 aerofoil section with a chord of 75 in. is employed in the middle, and the wing is tapered down to a 48 in. chord at the tips. The Sloane curve is used for a tip section.

Spruce flanges and 1/16 in. plywood webs are used in the construction of the wing beams. The beams were designed for a load factor of four, based on a preliminary weight estimate. The final weight estimate, however, indicates that the machine as a whole will be much lighter than originally estimated, which will bring the strength up to nearly 5g.

The ribs are of the Fokker type, using a stiff wrapping paper for the web and ¼ in. square spruce cap strips and stiffeners. Ordinary airplane dope is used as a cement and protective coating. Preliminary experiments, using several varieties of cement and glue, indicated that dope was best for this purpose, since it proved to be the best cement and as a protective coating it added about 20 per cent to the strength of the paper while adding only about 4 per cent to the weight. An experimental rib of 6 ft. chord weighed only 0.22 lb. and supported a load of 264 lb. The ribs for the entire wing would weigh about 6 lb. (which is less than the weight of the fabric covering) and would support a load of over three and a half tons. The compression ribs are formed by lashing four ¼ in. square re-enforcements to the sides of a standard rib.

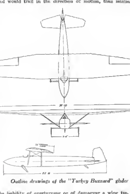
Two sets of internal drag bracing are used, one near the upper surface and one near the lower surface of the wing. This feature is designed to reduce torsional deflection.

The fuselage is built up of spruce and basswood without the use of wires or fittings. A streamline shape is provided by the fabric covering stretched over longitudinal fairing strips. Plywood gussets at the corner support the fairing strips and provide transverse bracing. The shape of the fuselage is a modified dirigible form. The corners of the transverse sections are rounded to form a sine curve.

The control surfaces are all internally braced. Tilting surfaces are used for elevators and rudders, there being no fixed surfaces. This feature simplifies the construction and should provide more sensitive control, especially at low speeds.

Landing Gear

The landing gear consists of a pair of skids, pivoted to the end of a torque tube which turns on bearings and is restrained by means of shock-absorber cord located in the fuselage. About two pounds of weight might have been saved by supporting the outboard ends of this tube with struts, but it was considered that this small saving would not warrant the complication. This landing gear has been designed particularly for landings with considerable side drift. The skids, being pivoted on a vertical pin at their upper ends, are free to turn and would trail in the direction of motion, thus minimizing the liability of overturning or of damaging a wing tip. The tail skid follows conventional practice.



Outline drawings of the "Turkey Buzzard" glider

This landing gear, while serving well in landing, might offer a drawback in getting off unless an effective launching device is provided. Where no launching device is used it would probably be best to substitute wheels for the skids or else mount wheels which would drop off as soon as the plane is clear of the ground.

Following are the main specifications of the "Turkey Buzzard" glider:

SPECIFICATIONS OF THE "TURKEY BUZZARD" GLIDER

Span, 32 ft.	Aileron area, 16.2 sq. ft.
Max chord, 75 in.	Overall length, 22 ft. 6 in.
Min chord, 48 in.	Weight empty, 150 lb.
Wing area, 172 sq. ft.	Weight loaded, 300 lb.
Elevator area, 22.4 sq. ft.	Wing loading, 1.74 lb./sq. ft.
Rudder area, 6.7 sq. ft.	

Britain Against Aircraft Limitation

It was disclosed in the House of Lords on July 11 that the British Government thinks the present moment inopportune to initiate an international conference on the limitation of air armaments. The House was debating the motion introduced by Lord Gorell, aimed at having Great Britain join with the American Government for such a conference.

The Marquis of Salisbury, Lord President of the Council, said the Prime Minister had already set forth the Government's desire to co-operate to the utmost with other nations on the lines of the Washington agreements for the limitation of air armaments, but, while the situation in Europe was so strained, any steps in that direction now would be wholly fruitless, and there would be almost a certainty of being misunderstood.

AIRPORTS AND AIRWAYS

This Department is concerned with all civil flying activities such as the establishment of airports, the marking of airways, warnings to airmen regarding obstructions, experiences gathered on flying routes and landing fields, the work of commercial aviation companies and private fliers, the formation of new air transport enterprises, personal paragraphs of general interest, etc.

Communications to this effect, addressed "Airways Editor, Aviation, 225 Fourth Ave., New York City", should be brief, accurate and to the point. They should deal with facts, not with theories or speculations. While American civil flying activities will naturally be given prominence, communications will also be welcomed from Canada, Mexico and other parts of the Western Hemisphere. EDITOR

This Freedom of the Air

Some time ago residents in the neighborhood of the Heath Airplane company's flying field near Chicago registered a complaint with the police department about the company's planes flying too low over the neighboring houses and amusement park. Walter Meyer, the pilot of the planes, was consequently arraigned in court and fined $50 by Judge Joseph S. La Buy for flying over the city at an altitude of less than 2000 ft. This is the first case where an aviator was actually fined, all other cases of this kind having been dismissed.

A city ordinance exists in Chicago prohibiting flying over the city at altitudes lower than 2,000 ft. But an exception is made where planes arise from or land on a flying field. The ordinance reads in part:

"No person shall fly over any part or section within the limits of the City of Chicago at a height lower than that enabling such aircraft to glide in any emergency and at all times to a known, established or recognized open or unobstructed place of landing on land or water, nor shall any person under any circumstances, special or otherwise, fly at a height lower than 2000 ft., except at the beginning or end of a flight."

As Meyers flies low only immediately after leaving or just before landing on the field, and otherwise for his own safety flies at much higher altitudes, well in gliding distance of the field, he is operating entirely within the law. Yet Meyers was found guilty of violating the ordinance.

The lawmakers may have assumed, says the Chicago *Uptown Times*, that all planes could attain an altitude of 2000 ft. above their own fields before flying out over the city. If the field is a mile or so square they can easily do so. But where it only covers a few blocks like that of the Heath company, the pilot has no alternative but to fly partly over the neighboring houses.

Seeing the danger that exists by not having an adequate place to "set down" if the motor suddenly stops after leaving the field, residents in the neighborhood request, and pilots often prefer, to make a quick turn within the field just after leaving the ground. They dispose of one danger, it is true, but get into one that is worse. In making the turn, the plane is still climbing and has not yet attained sufficient speed to support it while "banking" in the turn, with the result that the plane begins to slip sideways, and, being only a few feet off the ground, is in danger of crashing.

Short turns immediately after leaving the ground are so treacherous that Canada has included a clause in its air rules to the effect that no plane is to make a turn within less than 1600 ft. from the field when taking off or landing.

A "Gliding Stadium"

This is the name of a flying field which is being organized near Paris for the specific purpose of enabling young French gliding enthusiasts to practice gliding flights by means of Chanute type gliders. The field comprises a number of hangars and a specially fitted take-off trail. The organization of this field is due to the efforts of the French Society for Physical Education.

Richards Field, Kansas City, Mo.

Activities at the field for the month of June have been centered in two things. First in the meet that was held the 16th and 17th, and then in getting the field ready for the Officers Reserve Corps Air School that opened July 1st. Commercial and army ships to the number of 57 passed through the field during June. This is the largest number yet and just a fore runner of what is to come in the future. These included more Martin Bombers, Lincoln Standards, JN4 and 6's, Curtiss Orioles, and others, all bound for distant points of the United States.

On Sundays and holidays there are good crowds at the field and each week sees an increase over the last.

With the arrival of the 16th Observation Squadron, U. S. Air Service, from Ft. Riley, Kas., the work necessary to convert the field into an Army airdrome has been done.

The camp will be under the command of Maj. C. L. Tinker with the other officers of the squadron as instructors. The work, besides some military training, will consist of ground work, motor overhauling, rigging, theory of flight, aerial navigation, instruments, gun practice, radio, and aerial photography.

The personnel includes twelve officers, seventy-five enlisted men, trucks, tents and complete observation squadron equipment.

The flying meet started at 2 p. m., the 16th with 30 planes and soon after reached a total of 49 planes registered in for the events of the two days.

From the little "Houpizene" to the Martin Bombers everything was all that one could ask for and the events moved off with the old army snap and pep. They were full of interest to the thousands in the field and also to the thousands who parked their cars along the highways rather than pay admission to the field.

The events included everything from low and high parachute jumps, acrobatic contests for army and commercial planes to the races by the army planes, one each being entered from the different fields represented, were very exciting. It was some meet and it was well received as it was an education itself to see that number of planes in one place at the same time without seeing them flying or stunting.

International Air Commission

The International Commission for Air Navigation, officially designated as the C.I.N.A. from its initial letters in French, held a session June 24-30, last, in London, England, at which some important decisions were taken.

The most important of these is the abrogation of the provision of Article 34 of the International Air Convention which gives the British Empire, France, Italy, Japan and the United States two votes each on the Commission as against one vote each for all other countries.

Many countries, particularly the war-time neutrals, refused to adhere to the Convention on account of this discrimination. Now that it is abrogated, as was the equally objectionable provision of Article 5 whereby signatory powers were forced to prevent aircraft of non-signatory powers from flying over the former's territory, it is hoped that the Convention will receive the adhesion or ratification of all countries who have so far failed to do so.

Chicago News

The Heath Airplane Co has received a call from the Great Lakes Dredge & Dock Co to search the lake for a piece of water pipe 100 ft long by 4 ft diameter which rolled off a scow one stormy day last week. The pipe is worth several thousand dollars and in addition to its loss the company will have to pay a large penalty in case the work is not completed in time The company resorted to the airplane as the quickest and most economical means of locating the lost pipe

At the suggestion of R T Feeley, Evanston sales manager of the Evanston branch of the North Side Motors Co. of Chicago dropped advertising leaflets from an airplane, advertising a special car sale This advertising resulted in two sales. One leaflet was picked up by a man motoring through the forest preserve near Evanston, the other in the streets of Evanston by a little girl whose father thought the concern doing the advertising must be a pretty live house and worth while trading with

William Westlake, who has in the past done considerable flying at Black's airport, has lately spent the week ends at the various small towns northwest of Chicago, taking in Arlington Heights, Palatine and others.

There are now two ships flying at Morton Grove One belonging to Fred Sonni, formerly with the Hollingsworth fliers, is a standard with 185 hp Beardmore engine and is used for passenger carrying Richard Butcher has a Laird "Swallow" and is flying for the sport only

The *Uptown Times* is doing considerable airplane advertising Otto Klein, its aviation editor, flies a plane over the polo games and auto races every Sunday afternoon, then down the shore over the crowded beaches and back over the baseball park and other popular places The words "Uptown Times" are painted in big white letters on the bottom wing, distinguishable at 1000 ft.

John Miller of the Edgewater Beach air service delivered motion picture films of President Harding's funeral train to Milwaukee the afternoon the train passed through Chicago Miller, who is flying a Curtiss "Seagull", has just returned from a five weeks' stay at Green Bay Wis

Rin Gnther is recuperating from a serious appendicitis operation

Pilots Take Notice

Both the Heath flying field situated in the heart of Chicago at Western avenue and Grace street, and the Burmeister airdrome at Evanston are being made into golf links As a lot of dirt has been dumped here and there to construct bunkers, it is practically impossible to fly from these fields

The information contained in Air Service Information Circular No 403 p 46, concerning the Davenport (Iowa) Commercial Field is erroneous in several respects, C B D Collyer, pilot for the Skywriting Corp at America, informs AVIATION Instead of being one-half mile west of town—as the information reads—the field is actually *three miles east of city*, up stream, between the Mississippi river and the nearest railroad track on the Iowa side The field is 3000 ft square, level, and marked by the word POLARINE in white letters in the center of the field The hangars are on the south side of the field, near where the river runs east and west During the course of evolution of the Mississippi river this field has been known to be submerged during the greater floods which occur about once in twenty years

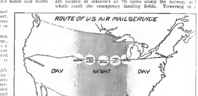
New Altitude-Weight Record

The Aero Club of France has homologated the record made June 1, 1923, by Warrant Officer Bury of the French army air service, who reached an altitude of 8466 m with a useful load of 250 kg The record was made with a Bréguet 14A2 equipped with a 300 hp Renault engine.

Start of the Night Air Mail

Night flying on the Chicago-Cheyenne section of the transcontinental airway of the Air Mail Service is tentatively scheduled to begin Aug 25. The ground equipment is already installed, but at the time of writing the flying equipment had not as yet been delivered Orders for specially designed night flying mail planes were placed by the Post Office Department with the Aeromarine Plane & Motor Co. of Keyport, N J, the Curtiss Aeroplane & Motor Co. of Garden City, N Y and the Glenn L. Martin Co of Cleveland, Ohio.

The lighting equipment of this route was furnished by three manufacturers, the General Electric Co of Schenectady, N Y, the Sperry Gyroscope Co. of Brooklyn, N. Y., and the Westinghouse Electric & Mfg Co of East Pittsburgh, Pa The General Electric Co. furnished thirty arc and incandescent type searchlights, totaling 175,000,000 candlepower, which are located at intervals of 25 miles along the airway, and which mark the emergency landing fields. Towering on



Courtesy Sperryscope

How the 28 hr day-night-day schedule of the Air Mail Service will work is graphically shown on this map

this lane of light there will be five aviation beacons of 325 000,000 candlepower each, situated at Chicago, Iowa City, Omaha, North Platte and Cheyenne, as shown in the accompanying sketch map These huge beacons, which were furnished by the Sperry Gyroscope Co are mounted on steel frame towers 60 ft high or on suitable buildings if available. One half horsepower geared motors will keep the big lights revolving in a circular manner One sixth horsepower motors will keep the smaller lights in motion It is estimated that the big lights will be visible a distance of 50 miles and the smaller one for 30 miles Thirty-six inch projectors will be used for the big aviation beacons and 18 in projectors for the emergency field markers

The flood lights and position lights of the fields were furnished by the Westinghouse Company

Ferdinand's New York Representative

L. W Ferdinand and Co, the well known importers and distributors of Jeffries Marine Glue, which is extensively used in seaplane construction, have appointed August Schlutter, formerly president of The New Process Chemical Co, as their representative in New York. His address for mail will be P O Box 136, Rockville Center, New York

Harry A. Bruno Resigns from Aeromarine

Harry A Bruno, who for the past three years has been prominently identified with the Aeromarine organizations, has resigned as vice president and sales manager of the Aeromarine Airways, Inc. While Mr Bruno has not as yet definitely announced his future connection, it is understood that he will be engaged in general advertising and publicity work.

Macready's Record in Danger

Sadi Lecointe, the well known pilot of Nieuport racing planes, who has been several times world's speed recordman, on Aug 2 made an altitude flight reaching 10,900 meters over Villacoublay airdrome, near Paris. The press dispatches do not state whether this figure takes into account corrections for instrumental error and temperature variation, but if it does then Sadi Lecointe has handsomely beaten the existing world's altitude record, held by Lieut. John A Macready, A S, with 10,518 meters (34,509 ft.).

If, however, the figure given as the new record does not allow for instrumental and temperature correction, it is likely that the performance will be scaled down considerably, and probably below Lieutenant Macready's mark. It may be remembered that the American pilot's altitude was first given as being over 38,000 ft., and that this figure was scaled down by the corrections mentioned by about 2500 ft Lieutenant Macready's record was made Sept. 28, 1921, at McCook Field, Dayton, Ohio, with a Lepère biplane equipped with a supercharged Liberty engine

Third Baracca Cup Race

The third annual contest for the Baracca Cup, Italy's aviation classic, which was held June 18-19, last, at Milan, was won by Capt. Renato Mazucco, last year's winner, who thus became the definite holder of the Cup The contest was run over a cross country circuit of 1000 kilometers length starting from Milan, with obligatory points of passage at Bologna, Bassano, Padua, Udine, Gorizia, Trieste, Venice, Padua, Verona, and return to Milan Captain Mazucco, who flew a Spad pursuit plane, covered the 1000 kilometers in 13 hr 26 min 18 sec elapsed time Captain Mosso, also on a Spad finished second, and Lieutenant Cerutti, on a Hanriot pursuit plane third

Out of eighty-eight entrants, seventy four started and forty-four finished, but of the latter only thirty four were placed, ten contestants being disqualified for infractions of the racing rules Ansaldo, Fiat, Caproni, SAML, Spad and Hanriot airplanes competed. Premier Mussolini, Director of Aeronautics, not only was present at the race, but he also personally gave the starting signal to the seventy four contestants

Czech Planes Win Belgian Contest

The Belgian competition for tourist planes organized by the Aero Club of Belgium and held June 30 and July 1 at Brussels, was won by the Czechoslovak pilot Zdenko Lhota on an Avia BH5 monoplane equipped with a 70 hp Anzani engine. Pilot Boeheler, on a Caudron, was second

The Avia, BH5 is a wooden cantilever monoplane resembling the Junkers, save that the wings are braced to the fuselage by means of two sloping struts. Its weight loaded is 550 kg with a pay load of 160 kg and a fuel load of 70 kg High speed is 155 km/hr and the ceiling 5000 m. The safety factor is 10. This type has been adopted by the Czechoslovak air force for advanced flying training

It is worth noting that the machine which won the Belgian competition flew from Prague to Brussels in a non-stop flight, covering 800 km. in 5½ hr

King's Cup Race

The second annual race for the King's Cup, held at Hendon airdrome, near London, July 13 and 14 last, was won by Frank T. Courtney on a Siddeley "Siskin" pursuit plane equipped with a 325 hp Siddeley "Jaguar" air-cooled radial engine

The race was held over a round-Britain circuit of 800 miles length which had to be covered in two days, as follows: Hendon to Glasgow with landing at Birmingham and Newcastle-on-Tyne on the first day, and return to Hendon with landings at Manchester and Bristol on the second day Out of seventeen entries fourteen started and seven finished. The race was a handicap affair and included machines with horsepower varying from 90 hp to 450 hp, the slowest machine starting with a handicap of 1 hr. 34 min. 27 sec

Courtney, the winner, started with a handicap of 18 sec., arrived first in Glasgow and finished the race in 5 hr 25 min. 20 sec flying time, or approximately 150 m./hr.

Flying over Germany

Recently the Royal Aero Club of Sweden notified the French and Belgian governments that the German government had refused to permit French and Belgian aircraft to fly over Germany en route to the international aero exhibition at Gothenburg, Sweden.

As under the treaty of Versailles, which the Germans are so fond of blaming for all their ills, Germany has a perfect right to close its frontiers to foreign civil aircraft, this prohibition would have prevented French pilots from competing at Gothenburg Although the French could have convoyed their civil planes by a couple of pursuit and bombing squadrons, they preferred to remain within the stipulations of the treaty, and decided not to send any civil aircraft to Sweden However, in order to insure French participation, they decided that the Swedish contests would be entered instead by military aircraft, which are authorized under the Treaty of Versailles to make use of German landing facilities without risking seizure.

It may be mentioned in this connection that Germany continues to seize French commercial aircraft which have forced landings in Germany, and to refuse meteorological information on the German sections of the Strasbourg Warsaw airway During the month of May three French airplanes were thus seized out of 350 which operated between Strasbourg and Prague, and since then seven more machines have been seized The French government has not so far made any decision in this matter, and its easy ways may be contrasted with the attitude of Great Britain when Russia seized some British trawlers. Some sharp diplomatic notes quickly forced Russia to effect restitution, reparation and excuses

Fire Protection on Airplanes

Some interesting experiments with a new fire extinguisher for airplanes were recently conducted by the *Service Technique* of the French army air service at Villacoublay airdrome, near Paris. The apparatus, invented by M Hermann-Anclair, was mounted on a Bréguet plane powered with a 300 hp Renault engine which is equipped with twin carburetors.

In order to test the extinguisher under maximum conditions of fire hazard, pieces of cotton waste soaked in gasoline were placed under the carburetor, leaks were created in the fuel tank and lines, and the entire engine was sprayed with gasoline The engine was then set on fire by means of a blow torch, and the extinguisher was put in operation only when the flames reached the pilot's cockpit, which was incidentally occupied by a pilot When the pilot turned on the fire extinguisher which is controlled from a handle in the cockpit, the fire was extinguished in a period varying from seven to twenty seconds.

An important feature of this fire extinguisher is that the liquid which it projects upon the fire does not impair the functioning of the engine in the least

French Gliding Competition

The Second Congress of Motorless Flight, as the glider and light plane meet organized by the Association Française Aérienne is officially termed, started Aug 5 at Vauville, near Cherbourg, France. There were fifty-six entries, nineteen of which are equipped with small power plants. On the opening day only one fourth of the contestants had arrived

The congress has offered 100,000 francs in various prizes for the contests, but the main object of the gathering will be for technical study, rather than spectacular performances, as on previous occasions.

British Aerial Derby

This year's British Aerial Derby, held Aug 5 over a 200 mile course around London, was won by L. L. Carter, starting from a scratch, in 1 hr 2 min. 23 sec., at an average speed of 192.4 m p h Carter flew a Gloucestershire racer equipped with Lamblin radiators.

Ten minutes and 46 seconds behind him, figuring the handicap, was W H Longton, and third was Capt. C C Barnard, whose time was 1 hr 21 min 1 sec

Thirteen airmen participated in the race

U. S. ARMY AND NAVY AIR FORCES

U. S. ARMY AIR SERVICE

New Anti-Aircraft Equipment

An intensified study is being made by the General Staff, the Ordnance Department and the Coast Artillery of the problem of anti-aircraft defenses, according to *Army and Navy Journal*, from which the following particulars are taken. The Coast Artillery will be depended upon to furnish the personnel, the Ordnance to develop the guns and the General Staff to work out a general policy.

There are now in the Regular Army two skeleton regiments of anti-aircraft artillery. They are the 64th at Honolulu and the 62nd at Fort Totten. Three battalions with a somewhat enlarged organization armed with different types of guns and searchlights have been organized in the Regular Establishment. One battalion is stationed at Fort Monroe, one at San Francisco and one in the Philippines.

This of course, is not sufficient for the mobile forces of the Regular Army. The three battalions should be at least expanded to regiments. This force in the event of war, could be expanded to fill out the Regular Army divisions. It would also make a training force for the National Guard and Organized Reserves, where shortage of A. A. artillery is just as marked as in the Regular Army.

But there is still a larger problem which has only received cursory attention. It is being recognized that an independent defense for the larger cities and important industrial centers must be provided for if aircraft continues to develop. It is understood that those in authority are of the opinion that steps for a general air defense should not be taken until the Ordnance Department has fully determined upon the most efficient and effective anti-aircraft artillery.

A .50 caliber machine gun is now being manufactured for issue to organizations and for extensive tests. Ultimately it will replace the .30 caliber anti-aircraft machine gun. The .50 caliber machine gun has a horizontal range of 27,000 ft. Its effective vertical range is from 9000 to 12,000 ft. According to tests, it will fire at the rate of 500 shots per minute. Visible range tracer ammunition for it has been developed to 7500 ft. A 37 mm. machine gun is now being developed. Several models have been manufactured for proving ground tests. It has tracer ammunition which is visible for ranges up to 15,000 ft. Its rate of fire has been from 100 to 120 shots per minute. Its effective range has been developed to over 27,000 ft. This gun will have a super-sensitive percussion fuse. The shells will all be high explosive and will explode upon the impact with a piece of balloon cloth. It is proposed to place four guns on one mount having a single telescopic sight for all. Four guns so in place will form a miniature battery, trained by a single observer and capable of shooting between 400 and 500 rounds per minute.

What is believed is a very effective 3 in. anti-aircraft gun is nearing completion and will soon be tested on the proving ground. It has a mobile mount and weighs seven tons. The rate of fire is fifteen shots per minute and it has an effective range altitude up to 21,000 ft. Its horizontal effective range is 38,825 ft. The weight of the projectile is 15 lb.

The largest type of anti-aircraft gun is a 4.7 in. gun which will throw a projectile weighing 45 lb. at the rate of fifteen shots per minute. It has an effective altitude of 45,000 ft. and a range of 71,000 ft. Its weight is 12 tons. It is equipped with a power loading device and with automatic breech blocks.

In general, all the new anti-aircraft guns are being developed for a system of indirect aiming. Extensive experiments have conclusively shown that a central station is far superior to the old instruments of fire control. Two general types of central stations are now being developed. Both have proven more accurate and require less time in directing the fire of the anti-aircraft guns.

The experiments with the 60 in. Sperry-Dishpan searchlight, concludes our contemporary, has shown almost unbelievable results. This light has been effective at the range of from 15,000 to 18,000 ft. The width of the beam at 18,000 ft. varies from 600 to 1800 ft. With such a ray an airplane traveling at the rate of 100 m.p.h. would require almost twelve seconds to go through the beam. When such a searchlight locates an aviator the operator of the machine can keep him in view, it is believed, until a powerful anti-aircraft gun can train its fire upon him.

Air Service Troops on Border

The Division Air Service, First Cavalry Division, returned to Fort Bliss, El Paso, Tex., their home station, on June 16, after a period of two weeks field training spent in camp at Ruidoso, N. M., a distance of about 140 miles from the home airdrome. This period of field training was requested in order that the functioning of the various sections and departments might be given a practical test before going into the field with the First Cavalry Division at Marfa, Tex., during September and October. The units taking part in the training were the Headquarters Division, Air Service, Twelfth Observation Squadron, First Photo Section, and 32nd Air Intelligence Section.

Complete equipment was taken, and flying missions and general training carried out. The truck train consisted of fifteen trucks, photo truck and trailer, field lighting set, gas and oil tank truck and cargo trailers. The airplanes of the Squadron arrived at camp at 6.00 p. m., June 4, and the camp was complete and ready for any type of aerial mission. The camp was named "Camp Milvard" in memory of a former member of the 12th Squadron who was killed in an airplane crash.

Ruidoso, N. M., is located just north of the Mescalero Indian Reservation, and the altitude is about 8000 ft. It is surrounded by high mountains covered with heavy pine forest. A beautiful, clear cold mountain stream, the Ruidoso River flows past the settlement.

Bombing Demonstration at Camp Stanley

A joint bombing and machine gun demonstration was recently engaged in at Camp Stanley, Tex., where a dummy artillery battery had been emplaced for the purpose. The dummy artillery pieces were made up of sections of telephone poles mounted on old escort wagon wheels, the gun crews being represented by silhouette targets. The bomb attack was carried out by the bombing section of the 10th School Group (Kelly Field) and the machine gun attack by the Attack Group. Although no official report has as yet been received from the Artillery, it is known that the Artillery considered the battery practically wiped out. The guns were either turned over or otherwise damaged, and the targets representing the personnel were almost all pierred by fragments of bombs, or machine gun bullets.

Broadcasting Meteorological Reports

Broadcasting of meteorological reports from Arlington by remote control from Bolling Field on 30 K.W. Navy arc set on a wave length of 5950 meters began at 7.30 a. m. on July 20.

These broadcasts are made daily, Sundays and holidays at the following hours, Eastern Standard Time: 7.30 to 7.50 a. m.; 9.30 to 10.00 a. m., 1.00 to 1.20 p. m., 3.00 to 5.20 p. m. The broadcasts contain current weather conditions along routes of the model airway. In addition, at the completion of the 9.30 broadcast, the weather forecast for all routes on the model airway for the afternoon and following morning are sent out.

The Immortal "Jennies"

The first lot of forty remodeled JN type of Curtiss planes for use in primary training and for the R.O.T.C. and National Guard are coming through the shops at the Fairfield Air Intermediate Depot, Fairfield, Ohio. Of several thousands of various types of this plane built by the Curtiss Company during the war, quite a number are still on hand to be remodeled.

It will be remembered that the original planes furnished in 1917 were given the symbol or type designation of JN, which gave rise to the familiar name of "Jennie". The earlier types were JN4A, JN4B, JN4C and finally the JN4D, best known to the cadet of late '17 and early '18 as the "Crate" which was equipped with the old reliable OX5 motor.

Later types furnished early in 1918 were equipped with the Hispano-Suiza engine, now known as the Wright engine, and to the JN4 symbol was added the letter "H" to designate such equipment. Subsequent models furnished carried additional letters, denoting the particular type of work for which it was designed and also introducing the double aileron with a change in the symbol from 4 to 6, chief among which were the JN6HB (Bombing) JN6HO (Observation) JN6HG (Gunnery) JN6HP (Photographic) and so on with many additional symbols added by the flying fields to designate certain changes, good or bad, which have been incorporated at that field.

Following a recent decision to rebuild a large number of these old planes, the necessity of standardization was apparant and consequently, the designing and drafting forces at Wilbur Wright Field went to work upon this project, producing a composite model for dual control which was given the symbol JNS.

The Wright "I" engine was adopted for this model and equipped with ample oil tank and radiator. The standard gasoline tank has been retained and an emergency gravity tank in the central section included. Control for both tanks is available from either cockpit. The old electrical system has been retained, but a safeguard is introduced in the nature of a little metallic flag which normally folds against the outside of the fuselage when the switch is "on", but is immediately thrown out at right angles to the fuselage when the switch is "off", thereby giving positive information as to the condition of the switch to whoever may be working on the engine or propeller.

Elevator controls have been redesigned and are somewhat heavier than before. The single aileron has been retained and otherwise all surfaces remain the same.

Instrument boards have been changed to some slight extent. The board in the front cockpit carries a complete set of instruments while the rear board carries compass, altimeter and oil and gasoline pressure gages. The rear board is also perforated with two holes of about 7 in. in diameter through which the pilot in the rear cockpit may have full view of all instruments on the front board.

Control sticks are of laminated wood, since it has been demonstrated that this type of stick is nearly three times as strong as the steel stick formerly used.

This standardization, it is expected, will reduce by 50 per cent the number of parts formerly required to be carried by Supply Depots to keep all of the older models in condition. It is expected that a complete catalog with price lists on this new standard "Jennie" will soon be prepared for issue by the Property Maintenance and Cost Compilation, Fairfield Air Intermediate Depot.

Flying Directions for Airways

Great interest is being manifested by Army, Navy and civilian aviators in the investigation of airways for obtaining information for the Route Information Series published in the Aeronautical Bulletins by the Airways Section, Office of the Chief of Air Service.

A loose-leaf sheet is printed covering each section of the airways system averaging between 100 and 200 miles in length, the first page covering information in one direction and the second page covering it in the return direction.

Orders have been issued by the Office of the Chief of Air Service to fifteen Air Service stations for carrying on the work of investigating airways. Descriptions of airways are being received from time to time, and up to the present time ten sections of the proposed airways system have been covered and reported on, as follows:

Bulletin No. 1 (Between San Francisco, Calif., and Sacramento, Calif.) and Bulletin No. 2 (Between Sacramento and Redding, Calif.) reported on by Crissy Field.

Bulletin No. 3 (Between Los Angeles, Calif. and San Diego, Calif.) reported by Rockwell Field.

Bulletin No. 4 (Between Wichita, Kans., and Kansas City, Mo.) reported by Fort Riley.

Bulletin No. 5 (Between Washington, D. C. and Philadelphia, Pa.) reported by Aberdeen Proving Grounds, Md.

Bulletin No. 6 (Between Wilmington, N. C. and Langley Field, Va.) reported by Langley Field.

Bulletin No. 7 and 8 (Between El Paso, Tex., and Tucson, Ariz., and Tucson, Ariz. and Nogales, Ariz.) reported by Fort Bliss.

Bulletin No. 9 (Between Fort Sill and Tulsa, Okla.) and No. 10 (Between Fort Sill and Wichita, Kans.) reported by Post Field.

There are approximately 175 sections of the proposed airway system to be covered in this way, and as rapidly as sections are being described and information received in the Airways Section, O.C.A.S., Aeronautical Bulletins are being published and will be circulated with the same mailing list as the State Series of the Aeronautical Bulletins. Credit is being given in this bulletin to the officers making the report and, needless to say, it is hoped that great care will be taken in the preparation of this information in order that it may be entirely accurate.

National Guard Air Service

A total of eight officers and 181 enlisted men were gained by the Air Service units of the National Guard between June 30, 1922, and June 30, 1923. One new observation squadron, the 111th, was recognized during the year, while two corps observation squadrons, included in last year's tabulations, have been transferred to a division.

Michigan, Illinois and Colorado, are making efforts to have their observation squadrons recognized during 1924, which units when federally recognized will operate with the 32d, 33d and 45th National Guard divisions.

U. S. NAVAL AVIATION

Kite Balloon Hangar for Lakehurst

The Bureau of Yards and Docks of the Navy Department on Aug. 7 awarded a $9,000 contract for the erection of a kite balloon hangar at the Air Station, Lakehurst, N. J. The use of kite balloon at that place for aerological purposes is an established practice, and the new hangar will replace a canvas shelter recently lost in a high wind. In view of the

COMING AERONAUTICAL EVENTS

DOMESTIC

Oct. 1-3 — National Airplane Races, St. Louis, Mo.
Late Fall — Curtiss Marine Flying Trophy Race

FOREIGN

Aug. 3-31 — Sailplane Meet, Rhoen, Germany
Aug. 5-26 — Sailplane Meet, Vauville, near Cherbourg, France
Sept. 23 — Gordon Bennett Balloon Race, Brussels, Belgium
Sept. 28 — Schneider Marine Aviation Trophy Race, Cowes, Isle of Wight, England
Dec. 1 — Entries close for French Engine competition

fact that helium will be used for the inflation of the big Navy airships, it is thought advisable to keep the main hangar free of all hydrogen units with their attendant dangers of fire or explosion; hence the necessity of a separate structure for the kite balloon. The proposed hangar will be 66 ft by 100 ft in plan, by 40 ft. high. It will be assembled from parts to be shipped from the former air station at Yorktown, Va., which has been out of commission for the last two years.

Parachute Training

Work in parachute jumping by the Naval men stationed at McCook Field has been continued with very satisfactory results. The following extracts from a report on the subject is of interest,

"Studies are now being made of the various methods of jumping out of balloons and various types of airships with slow moving pictures taken to show the actual operation of parachutes.

"An argument arose during the past week as to what would happen if both chutes of a training pack were released—some holding that as soon as one chute opened the other would close, others, that both would function. There was only one way to determine this and that was to make an actual trial. Chief Aviation Rigger Starr essayed the jump on Monday afternoon, making a perfect take off and, after falling 50 to 100 ft., opening his first chute. After falling a distance sufficient to get control of his chute, he tripped his emergency with surprising results. As soon as his emergency sprung open the first chute collapsed and came down over his head. He managed to get the shrouds clear of his head, then his main chute decided that it would open, so again it flew open. Thereafter, it seemed to be a tug of war between the two chutes as to which would save the jump.

"Starr reports he was busier than a "bird dog catching fleas" keeping the two chutes from fighting and therefore, could not watch his landing as well as usual. He states that this jump proves conclusively that in case of failure of either chute, the other one will work, or both will work together, but also adds that if anybody is doubtful they can try it themselves—he's through. Starr is nursing a strained neck caused by his first chute deciding to open while his head was tangled in the shrouds.

"Ford made a perfect "live jump" on the same day with a perfect landing.

"It is hoped that the film, taken with slow moving pictures, showing all phases of this parachute work will soon be available for distribution. Two cameras were used on these last jumps so that the fall from the time Ford and Starr left the ship until they hit the ground are shown perfectly, except a space of perhaps 50 or 100 ft. where Ford was traveling too fast for the moving picture camera man to follow with a plane."

Larger Tanks for DT's

Two DT2 land planes from Torpedo and Bombing plane Squadron Two accompanied the DH4B planes from Observation Plane Squadrons One and Two on their flight to Seattle in July. The DT2's were used for investigating landing fields, taking photographs of regular and emergency fields. These planes are equipped with specially designed cylindrical streamlined tanks, with a bulkhead intersecting, making two separate tanks in one. They have a total gasoline capacity of 275 gal. A valve manifold facilitated the opening and closing of valves that permit gasoline to be pumped from one tank separately.

Shed Trials of ZR1

Such shed trials of the rigid airship ZR1 at Lakehurst as can be made without the ship being inflated are now in progress. Vertical and horizontal controls, various communication installations from control car and other parts of the ship are being tested.

The airship will be inflated with helium about Aug. 7 and other trials held. A photographic laboratory now being installed on ZR1, will be equipped for developing and printing photographs and motion pictures while in air. It will be located in the keel of the ship.

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